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The relationship between processed meat, red meat, and risk of cardiovascular disease and Type 2 diabetes: a Mendelian randomization study

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Abstract

Aims

Numerous observational studies have indicated a potential association between the consumption of processed and red meat and an increased risk of cardiovascular disease and Type 2 diabetes mellitus (T2DM). However, the presence of a causal relationship remains uncertain. Therefore, the purpose of this study was to evaluate the impact of processed meat and red meat (pork, lamb, and beef) on the risk of cardiovascular disease, including coronary artery disease (CAD), hypertension, and stroke, and T2DM, using a two-sample Mendelian randomization (MR) analysis.

Methods and results

An MR analysis was conducted using the inverse-variance weighted, weighted median, and MR-Egger methods. To identify heterogeneity and pleiotropy, Cochrane's *Q* test and MR-Egger test were employed. Additionally, the stability of the MR results was assessed using the leave-one-out method. Inverse-variance weighted analyses reveal no causal association between the consumption of processed and red meat and the incidence of CAD, hypertension, stroke, and T2DM ($P > 0.05$). When considering processed meat intake,

heterogeneity is observed in hypertension and stroke outcomes ($P < 0.05$). For pork intake, heterogeneity is seen in hypertension, stroke, and T2DM ($P < 0.05$). Lamb intake shows heterogeneity in hypertension and T2DM ($P < 0.05$). However, other exposures and outcomes examined show no heterogeneity ($P > 0.05$). No significant pleiotropy is detected for all exposures through an MR-Egger test ($P > 0.05$). Furthermore, the leave-one-out test demonstrates the robustness of the results.

Conclusion

The study discerned no observable impact of red and processed meat consumption on CAD, hypertension, stroke, and T2DM. The findings of this study challenge the prevailing conventional perspective in the field.

Lay Summary

This study aimed to investigate whether eating processed and red meat increases the risk of heart disease, high blood pressure, stroke, and Type 2 diabetes. Using a genetic analysis method called Mendelian randomization, the research team analysed genome-wide data to assess meat consumption and its potential health effects.

- The study found no evidence of a causal link between processed and red meat consumption and the development of cardiovascular disease or Type 2 diabetes.
- Although some heterogeneity was observed in the data, particularly when it came to the association between beef and lamb consumption and coronary artery disease, no significant pleiotropy or instability was detected, indicating that the findings were reliable. The results challenge the common belief that processed and red meat

consumption significantly contributes to the risk of cardiovascular disease and Type 2 diabetes. However, it is important to note that other factors, such as dietary patterns and individual health conditions, may still affect these outcomes.

Processed meat, Red meat, Cardiovascular disease, Type 2 diabetes mellitus, Mendelian randomization, Genome-wide association studies

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